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ARE YOU READY TO PROVIDE INSTRUCTION VIA INTERACTIVE SATELLITE DELIVERY TECHNOLOGY?

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A difficulty for faculty new to teaching at a distance is being able to visualize the scope of needed skills and tasks that will be required of them. The purpose of this project was to provide an empirically-based, self-administered skill enhancement guide for new distance education faculty teaching via interactive satellite broadcast. A modified Delphi approach was used to survey 18 faculty members experienced in distance education from the 6 colleges at a major eastern university. Respondents created a validated task list in phase 1 and determined task criticality and sequencing of task learning in phase 2.

Distance education in electronically distributed formats has become a cornerstone for many universities, community colleges, and selected secondary educational programming. Technology's role in distributed distance learning has progressed from early use of radio (1920s) and television (1940s), to today's interactive satellite and Internet broadcasts (Miller & Cruce, 2006). Current distance learning formats incorporate advances in telecommunications, micro processors and computer technology enabling interactive audio, video, and text exchanges. These formats include; synchronous, asynchronous, online, two-way audio and video, video streamed, podcasting, and various combinations of these (hybrids). Some models include traditional physical face-to-face sessions combined with distance techniques (Twigg, 2003). This rapid advance in the technology of delivering distance education has sometimes challenged faculty and staff development personnel due to the steep learning curve. These two sets of professionals are primarily concerned with the charge to deliver quality instruction in a manner as seamless as possible. The distance learner should be able to focus on learning—not the technology used to deliver the instruction.

Most research conducted from the late 1980s to the present supports the idea that stu-

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dents learn as much via distance environments as in face-to-face settings. This finding is referred to by researchers as the *no significant difference* phenomenon (Russell, 1999). However, for some faculty members, teaching at a distance, with its lack of physical face-to-face contact with students in the classroom, remains an issue (Bower, 2001). Also, some faculty members remain skeptical that the same type and depth of learning exchange/ learning satisfaction can be achieved via distance technology as in face-to-face classroom environments (Ndahi, 1999). The technology that makes sophisticated electronically distributed instruction possible can also present deterrents to a free flow of ideas. For example, live discussion via two-way audio produces bottlenecks or talk-over when more than one student attempts to respond at one time using microphones that require pushing a button to talk. This may result in student and/or instructor frustration. Overall, however, distance education seems to work and, coupled with the savings to educational institutions via economies of scale, promises to remain a major part of academic programming (U.S. Government Accountability Office, 2002, 2004). Business and especially the military also rely on distance learning technologies to keep employees and troops up to speed on current job skills and technology.

One aspect of distance education that has not changed during these recent technological advances is the need to train and support faculty who conduct the instructional sessions. A majority of educational institutions provided some type of staff development/training during the early adoption phase of distance learning programming (Bower, 2001). A danger in having distance learning accepted as commonplace is that institutions may lose the imperative for continued training of faculty for distance learning technologies. Of special concern is the faculty member new to distance learning platforms.

A difficulty for faculty new to teaching via satellite broadcast (as well as other forms of distance education) is being able to visualize the scope of needed skills and tasks that will be required of them. This includes both traditional instructional skills as well as skills needed to make the technology work seamlessly in the best interest of the learner and the faculty member's instructional charge. A third aspect is how to integrate the technology with instructional tasks to provide a holistic systems approach to the teaching and learning experience. It requires much more than simply adding technology to instruction (instruction plus technology *plus* seamless integration of each).

PURPOSE

The purpose of this project was threefold: first, to provide a tool to assist faculty new to teaching via satellite broadcasts that would assist them to understand the total scope of their assignment; second, to help them identify skills that they still needed to acquire; and, third, to help faculty become more self-directed in their efforts to prepare for teaching via this format. This tool would take the form of an empirically based, self-administered skill enhancement guide for faculty teaching via this one model of distance education: site-based interactive satellite broadcast. (By site-based is meant that the broadcasting institution provides downlink facilities and support staff at geographical points of critical mass for student travel convenience. Students then attend classes at these regional downlink sites.) The project was conducted in two phases: one, development of the task list and, two, critical rankings and sequencing of these tasks and development of the resulting self-administered skill enhancement guide.

REVIEW OF PHASE ONE

Phase one of the project, conducted during the 2003-2004 academic year, involved the development of a validated task list for teaching via site-based satellite broadcast. The response panel was limited to faculty providing site-based satellite broadcast instruction from one

university in order to draw from faculty using the same model, site-based two-way audio with one-way video. The university is the largest provider of distance education using this model in the United States. Academic year student enrollment is more than 21,000, with approximately 250 distance education faculty. The university has site partners (e.g., community colleges) at approximately 50 locations within Virginia, and voluntary arrangements with institutions in Washington, D.C., Arizona, Illinois, Washington, and Georgia that provide downlink classrooms in strategic locations. A site director (sometimes with an assistant, depending on enrollment at each site) employed by the university supervises each site (Old Dominion University, 2005).

The research procedure utilized a modified version of the Delphi approach to problem solving. This methodology has been applied with some success in curriculum development projects (Custer, Scarcella, & Stewart, 1999). Rather than begin with a panel of experts and a blank page as in the original Delphi technique, this modified approach begins with the development of a straw list of tasks developed from the literature (English, 1998; Shank, 2004) plus personal experience of the two investigators. This initial task list was edited and revised by six faculty members in two departments in the college of education with experience in teaching via satellite broadcast. They also suggested additional tasks to be added.

Following revisions to the straw task list, a request was made of the vice president for distance learning for the university to provide a list of faculty experienced in teaching via this format from each of the six colleges within the university. The six colleges included arts and letters, business, engineering, health sciences, science and computer science, and education (generic names used here for the six colleges). This list was augmented by one of the lead instructional specialists on campus responsible for providing support to distance learning faculty. From this pool, three faculty members were randomly selected for each college. These 18 faculty members were then contacted to request their cooperation in the study. Sixteen agreed. Additional names were pulled to replace the missing two, contacted, and, with their approval, included in the sample. The 18 members of the survey sample group ranged in experience from having completed as few as 3 to as many as 50 satellite broadcast classes each. The mean level of classes taught using this format was 21.

All 18 faculty panel members provided usable responses to the initial task validation process. They were asked to indicate whether the task should be retained as is, retained, but modified as suggested, or deleted. From these results the initial straw task list was modified to meet the requested changes (Turner & Reed, 2005).

PHASE TWO FINDINGS

Phase two of the project was completed during the 2004-2005 academic year. In order to measure the level of criticality of each task relevant to the completion of successful satellite broadcast instruction, the original 18 sample respondents were contacted regarding their willingness to continue. Thirteen of the 18 were available to complete the second round of the survey. Since creation of the task list in phase one was independent of the need to rank each task as to its level of criticality, additional members of the original pool of experienced faculty were randomly selected and contacted until the number equaled 18 members (three from each of the six colleges). They were each asked to rank the level of criticality of each task on a 1 (low) to 10 (high) scale regarding its importance to conducting successful satellite broadcast instruction. They were also asked to indicate whether the skills to perform each task should be acquired before the first class assignment, during the first class, or during subsequent classes. Again, all 18 respondents returned usable survey forms. Results of the ranking of task criticality (beginning with Table 1, prerequisites) and sequencing (beginning with Table 2) are reported below.

Respondent's ranking of when new faculty should be prepared for each task is shown as percent responses for (B) before the first class, (D) during the first class or (S) during subsequent classes. (Where the three percentages do not equal 100%, one or more respondents chose not to sequence that task or simply missed the data response blank.)

Table 1 lists faculty prerequisite skills that respondents felt were important for teaching via interactive satellite broadcast format. Faculty that have been asked or volunteered to begin teaching using this format may find these skills important for reviewing their existing skills.

Table 2 lists tasks/responsibilities for conceptualizing and developing a course for the site-based satellite broadcast format. Respondents strongly felt that a management plan and documents that support communication were important. A course management plan would include tasks such as anticipating lead time for posting documents, scheduling events, handling e-mail, and establishing time for students. Documents that support communication include the syllabus, class policy, schedule/ course planner, detailed assignment explanations, and strategies for providing student feedback.

TABLE 1
Faculty Prerequisite Skills for Teaching via Interactive Satellite Broadcast

Faculty Prerequisite Skills	C^1
• Can demonstrate (or is willing to learn) instructional technology skills.	9.7
• Undertakes steps to enhance comfort level for teaching via interactive satellite broadcast by observing other instructors, guest appearances, micro sessions, etc.	8.6
• Is recognized as a content specialist in field of instruction.	8.3
• Has demonstrated effective classroom instructional skills	8.0
• Expresses willingness to work with experienced satellite broadcast instruction faculty mentor (as needed).	7.7

Note: C^1 = Mean score for criticality on 1L-10H scale.

TABLE 2
Conceptualizing and Developing a Course for the Interactive Satellite Broadcast Platform

		S^1		
Faculty Tasks/Responsibilities	C^1	*B*	*D*	*S*
• Develop a plan for managing time demands of satellite broadcast instruction	9.3	78	11	11
• Develop instructional communication documents.	9.3	94	6	0
• Adapt methods/strategies used in traditional class settings to work in a satellite broadcast environment.	9.0	61	17	17
• Design methods/strategies specifically for the interactive satellite broadcast platform.	9.0	44	17	33
• Structure your satellite broadcast class time.	9.0	61	17	17
• Design lab experiences for distance students (if applicable to course).	8.7	67	6	17
• Emulate/extend main campus library, laboratory, and computer help desk capabilities appropriate to your class.	8.7	61	28	11
• Research any unique learning needs of anticipated student population in assigned satellite broadcast class(s).	8.7	29	39	17
• Select and use the most appropriate/secure delivery/return system(s) for tests and exams.	8.0	67	22	11

Notes: C^1 = Mean score for criticality on 1L-10H scale.
S^1 = Percent selecting sequence of Before first class, During first class, or during Subsequent classes.

Respondents felt very strongly (98%) that the knowledge and skills needed to perform the task of developing instructional communication documents should be acquired prior to the first class. [Note: it is important to realize that this probably means obtaining these skills at least one semester prior to teaching the first class. The development of these documents must be completed and published several weeks prior to the first class session.] Seventy-eight percent of the respondents also felt that the task of developing a management plan for time demands should be completed before the first class.

More specific faculty responsibilities that focus on communication are listed in Table 3. Establishing a communication plan for class time, e-mail, telephone, and electronic discussion forum was tied for the highest criticality. Managing e-mail and discussion forums was also ranked at the top. Specific tasks instructors need include utilizing a teaching assistant (TA), deciding parameters for discussion topics, how to work with students who do not post discussions or send them to the instructor, and overall management of synchronous discussions.

A high percentage (72% or greater) of the respondents felt that the ability to perform six of these tasks should be acquired prior to the beginning of the first class. Only one—a plan to involve all students in group activities (if used in the class)—received less than 72% response. No clear reason for this was given. It may be that group activities are not suitable for classes taught by all respondents and that they responded from a personal perspective rather than strictly by the wording of the task.

Faculty responsibilities that focus on the use of the Web to support satellite broadcast instruction are listed in Table 4. Deciding how the Web should be used as an instructional tool was the responsibility ranked highest by the respondents. Tasks that would fall under this area include using the Web as a static resource, for instructional support, or to create an interactive course site. All respondents felt that the ability to perform these three tasks should be acquired prior to their first class.

Table 5 illustrates respondents' unanimous agreement that faculty teaching satellite broadcast courses should visit the studio to practice using the technology and work with their technician. Tasks under these responsibilities would include meeting the technician prior to the first class and coordinating the use of equipment during class.

Respondents felt strongly (94%) that the task of visiting the studio and practicing with the technology should be completed prior to

TABLE 3
Communication and Interactivity

Faculty Tasks/Responsibilities	C^1	S^1 *B*	*D*	*S*
• Establish/implement plan for communication between instructor, students, and student-to-student.	9.3	78	22	0
• Manage email and discussion forums (asynchronous and synchronous) [as appropriate to your class].	9.3	83	11	6
• Develop plan to attain appropriate levels of student instructional interaction.	9.0	72	22	6
• Plan ways of involving all students in group activities (if used).	8.7	67	28	6
• Decide how you will recognize/evaluate student input/ participation during class time and/or discussion forums.	8.0	83	11	6
• Develop learning community (communities) [as appropriate for your class].	7.3	78	11	11
• Plan for incorporating student presentations (if used) during class time.	7.0	72	7	11

Notes: C^1 = Mean score for criticality on 1L-10H scale.
S^1 = Percent selecting sequence of Before first class, During first class, or during Subsequent classes.

TABLE 4
Use of the World Wide Web to Support Interactive Satellite Broadcast Instruction

Faculty Tasks/Responsibilities	C^1	S^1 *B*	*D*	*S*
• Decide how the Web is to be used as an instructional tool.	9.3	100	0	0
• Decide which University sponsored software system(s) to use for providing Web support (asynchronous, synchronous) as appropriate to your class.	9.0	100	0	0
• Protect ownership rights of faculty developed material distributed (via the Web) to students in satellite broadcast instruction.	6.7	100	0	0

Notes: C^1 = Mean score for criticality on 1L-10H scale.
S^1 = Percent selecting sequence of Before first class, During first class, or during Subsequent classes.

TABLE 5
Studio Technology

Faculty Tasks/Responsibilities	C^1	S^1 *B*	*D*	*S*
• Visit the studio classroom to practice with the instructional technology, preview location of instructor console, and classroom layout.	10	94	6	0
• Work with the studio technician to provide smooth operation and transition when using studio equipment.	10	67	22	11

Notes: C^1 = Mean score for criticality on 1L-10H scale.
S^1 = Percent selecting sequence of Before first class, During first class, or during Subsequent classes.

TABLE 6
Instructional Support Materials/Technology

Faculty Tasks/Responsibilities	C^1	S^1 *B*	*D*	*S*
• Develop effective visual presentations	8.8	67	17	11
• Learn to use the digitized writing pad (if appropriate to content and lessons)	8.5	67	17	11
• Learn to Use the overhead camera with writing pad, slide masters, etc.	8.0	72	17	11
• Use videotapes effectively	7.7	61	17	22
• Use CDs/DVDs effectively (if applicable to course)	7.3	72	6	22
• Prepare back-up material (for emergency technology glitches)	7.3	72	11	7

Notes: C^1 = Mean score for criticality on 1L-10H scale.
S^1 = Percent selecting sequence of Before first class, During first class, or during Subsequent classes.

the first class session. Eighty-nine percent of the respondents indicated that working with the studio technician to provide smooth operation and transition should take place before or during the first class.

Instructional support materials/technology received some of the lowest criticality rankings by respondents (Table 6). The highest-ranked faculty responsibility in Table 6, develop effective visual presentations, includes tasks such as the effective use of fonts, colors, animations, and multimedia.

Responses as to when the new instructor should learn to perform these tasks were also

rated lower. Only three tasks—use of the overhead camera, using CDs/DVDs, and preparation of back up materials—were rated by at least 72% of the respondents as needing to be achieved prior to the first class.

Critical rankings for evaluation and grade posting are listed in Table 7. Respondents all agreed that showing students how grades are determined was important. Additionally, they all felt it was important to adhere to university policy with regard to the posting of grades. Interestingly, respondents were divided as to when they felt is was necessary for new faculty to review and adhere to university policy regarding posting of grades and how to provide timely response with critique to graded assignments.

Table 8 focuses on camera presence. Two highly ranked faculty tasks/responsibilities include helping students feel connected and experimenting with various positions (seated or standing) while teaching. Respondents varied as to when they felt it was necessary for the new faculty to master these skills: before the first class, during the first class, or during subsequent classes.

Faculty responsibilities for working with satellite broadcast instructional partners are ranked in Table 9. Respondents were unanimous that communicating needs to the techni-

TABLE 7
Evaluation and Grade Posting

Faculty Tasks/Responsibilities	C^1	S^1 *B*	*D*	*S*
• Consider developing a rubric to share with students showing how grades will be determined for each major project/assignment	10	89	6	6
• Review and adhere to University policy regarding posting of students' grades.	10	39	33	17
• Provide timely response with explanation/critique to students for each assigned project, test, etc.	8.7	39	22	33
• Decide whether to include and how to record student class participation as part of course grade	8.0	89	6	0

Notes: C^1 = Mean score for criticality on 1L-10H scale.
S^1 = Percent selecting sequence of Before first class, During first class, or during Subsequent classes.

TABLE 8
Camera Presence

Faculty Tasks/Responsibilities	C^1	S^1 *B*	*D*	*S*
• Assist distant students to feel "connected" during class time by looking directly at the camera as well as students in the campus (studio) classroom.	9.0	17	61	22
• Experiment with various instructor positions (seated or standing) with natural animation/movement	9.0	28	44	22
• Use a degree of formality that presents a professional image, is comfortable to the presenter, and pleasant to the students.	8.3	33	39	28
• Search for ways of presenting concepts visually through color, charts, real objects, etc.	7.7	67	17	17
• Avoid using stripes, checks, and the color white in personal dress (may not show well on camera.)	5.0	39	39	22

Notes: C^1 = Mean score for criticality on 1L-10H scale.
S^1 = Percent selecting sequence of Before first class, During first class, or during Subsequent classes.

TABLE 9
Work With Your Instructional Partners

Faculty Tasks/Responsibilities	C^1	S^1		
		B	*D*	*S*
• Effectively communicate your classroom technology needs with the studio technician	10	44	33	22
• Build an effective relationship with your instructional design resource person	9.3	83	11	6
• Work with site directors to develop a team approach that is supportive of student needs	9.3	28	39	28
• Use a team approach when working with teaching assistant, or student worker (if available)	8.0	50	33	11
• Research the assistance available in the (campus) instructional resource lab	8.0	83	6	6

Notes: C^1 = Mean score for criticality on 1L-10H scale.
S^1 = Percent selecting sequence of Before first class, During first class, or during Subsequent classes.

cian were vital to effective instruction. It is somewhat puzzling that 55% of the respondents felt that new faculty could wait until during the first class or subsequent classes to acquire this skill.

DISCUSSION

It is obvious from looking at the data that the respondents felt that the need to become adept with the studio/classroom technology was a most important task and that the skill to operate this technology solo and/or with the studio technician should be acquired prior to the first assigned course. Respondents also ranked at the highest level of importance the need to develop and make available to students rubrics to help explain how assignments would be graded. Additionally, following university policy regarding the posting of grades was ranked at the top of the importance scale. The high ranking for this latter task is related to the issue of security when posting student grades, especially the idea of using something other than a student's social security number and posting grades in a manner that make the data available to only the student who earned those grades. Universities have worked hard in recent years to develop student identification numbers that are not related to social security numbers. Use of software programs such as Blackboard does provide measures of security in addition to the use of student identification numbers.

Other tasks receiving high rankings of importance include tasks in communication and collaboration with students, early communication of detailed course documents such as syllabi and course assignments, faculty time management, e-mail, decisions regarding how the World Wide Web is to be used to support satellite broadcast instruction, building effective working relationships with campus instructional design support personnel, and working with downlink site directors to support student needs. Respondents ranked these important tasks differently in terms of when the faculty new to teaching via satellite broadcast should acquire skills enabling them to perform each task. For example, in relationship building, effectively communicating with the studio technician regarding technology needs was split across before the first class (44%), during the first class (33%), and during subsequent classes (22%). Obviously, respondents viewed the timing of when the skill should be acquired from different perspectives. Possibly, one difficulty for the respondents was in being asked to respond to a forced choice response, (i.e., forcing the response into any one of the three time periods as opposed to being able to indicate that the task or activity is important across all three time periods).

From the data resulting from this research, a self-administered skill enhancement guide was

developed by the researchers for voluntary use by faculty new to satellite broadcast instruction. This instrument when used by the faculty member should (a) help them envision the whole satellite broadcast instructional system as it relates to their responsibilities, (b) allow them to see what tasks other experienced faculty teaching via satellite broadcast feel are most critical, (c) gain insight into when skills should be acquired to perform each of these tasks; before the first course/class, during the first, or during subsequent courses/classes, and (d) become more self-directed in their preparation for teaching via interactive satellite broadcast.

WHAT THE DATA DON'T TELL US

One of the most interesting aspects of conducting the surveys in both phase one and two is that there were a number of factors of keen interest to a large segment of the respondents not revealed in the data. As often stated in the literature, there is concern by faculties in general regarding the additional time and expertise required (of faculty) to provide quality distance instruction (Ndahi, 1999; Ndahi & Ritz, 2002; Rockwell, Schauer, Fritz, & Marx, 1999; Zirkle, 2002).

After completing either or both of the survey rounds, respondents expressed varying degrees of frustration that the survey instrument did not deal more directly with faculty issues of distance education. This informal verbal and margin note feedback was sometimes strong. For example, when responding to the importance of Web site development (as support to satellite broadcast instruction) or the time required to provide adequate collaboration with students via e-mail or discussion forums, respondents appeared to have some difficulty distinguishing between the importance and sequence of the task versus (a) who should shoulder these responsibilities, (b) how to incorporate the extra time into their schedules, (c) problems of large class size, and (d) perceived inadequate/ineffectual response by administration to these issues. In general, a number of issues most often discussed in the literature as faculty concerns versus institutional or programmatic concerns regarding distance education were mirrored in the informal feedback from respondents in this study.

A second area of information observed by the researchers and not evident in the summarized data is that important differences may exist between subject area and/or discipline area preferences regarding the criticality of tasks and also the timing of when the faculty new to teaching via satellite broadcast needs to acquire the skills to perform tasks. For example, it may be that a faculty member teaching mathematics would view the use of the overhead camera recording his or her calculations on a writing pad (in lieu of a chalk or white board) as a most important strategy/technology. This is in contrast to a faculty member from management using case studies and discussions of those case studies as an important strategy in his or her teaching. The mathematics faculty member may not view case studies or group work as important tools in instruction via satellite broadcast. This is not to say that one is correct and one is not; rather, that different strategies may be more appropriate depending on the subject matter to be taught. This survey does not distinguish these differences.

SUGGESTIONS FOR FURTHER RESEARCH

As with most research, new questions arose during the conduct of these two survey rounds and analysis of the resulting data that beg for answers. Following are suggestions for additional research that should help clarify some of these issues.

1. A similar research approach should be used with larger samples of faculty within subject/discipline areas to determine task criticality. The resulting data

should allow staff development support professionals to better target the needs of individual faculty. It would also allow the new faculty member to develop a perspective of teaching via satellite broadcast more closely associated with experienced faculty in his or her own subject/discipline. (The current respondent sample was limited to three randomly selected experienced faculty members from each of six colleges on campus without identification of specific discipline or subject area.)

2. A different approach to determining the sequence of skill acquisition necessary to perform each task should be attempted. (A forced choice technique was used in the current research to determine when a faculty member new to teaching via satellite broadcast should acquire the skills to perform each task. These were: (a) before the first class, (b) during the first class, or (c) during subsequent classes. It was evident that a fourth choice may have been helpful. That fourth choice would have been (d) a combination of these.)
3. Research is needed that looks at other delivery methods. The current study focused on satellite broadcast with one-way video and two-way audio. Other delivery techniques such as streaming video via the Internet and nonstreaming Web-based instruction should be analyzed to see what skills are shared or unique to the various delivery methods.

REFERENCES

Bower, B. L. (2001). *Distance education: Facing the faculty challenge*. Department of Educational Leadership, Florida State University College of Education, Tallahassee, FL. Retrieved January 28, 2006, from http://www.westga.edu/~distance/ojdla/summer42/bower42.html

Custer, R. L., Scarcella, J. A., & Stewart, B. R. (1999). The modified Delphi technique: A rotational modification. *Journal of Vocational and Technical Education, 15*(2), 50-58.

English, J. (1998). *Teaching on television: The Center for Learning Technologies televised instruction teacher's guide*. Report produced for use by Instructional Technology Staff at Old Dominion University, Norfolk, VA.

Miller, M., & Cruce, T. (2006). A 20th century timeline: Classroom use of instructional film, radio, and television. Retrieved April 14, 2006, from http://www.arches.uga.edu/~mlmiller/timeline/1930s.html

Ndahi, H. (1999). Utilization of distance learning technology among industrial and technical teacher education faculty. *Journal of Industrial Teacher Education, 36*(4). Retrieved May 20, 2004, from http://scholar.lib.vt.edu/ejournals/JITE/v36n4/ndahi.html

Ndahi, H., & Ritz, J. (2002). Distance learning in industrial teacher education programs. *Journal of Technology Studies*, *28(1)*, 64-69.

Old Dominion University. (2005). *Distance learning*. Retrieved January 16, 2005, from http://www.odu.edu/oduhome/distance.shtml

Rockwell, S. K., Schauer, J., Fritz, S. M., & Marx, D. B. (1999). Incentives and obstacles influencing higher education faculty and administrators to teach via distance. *Online Journal of Distance Learning Administration, 2*(4).

Russell, T. L. (1999). *The no significant difference phenomenon: A comparative research annotated bibliography on technology for distance education*. Montgomery, AL: International Distance Education Certification Center.

Shank, P. (2004). *Competencies for online instructors*. Retrieved February 14, 2004, from http://www.learningpeaks.com/instrcomp.pdf

Turner, J. T., & Reed, P. A. (2005). Creation of a faculty task list for teaching in a televised distance learning environment. *Journal of Industrial Teacher Education, 41*(4), 5-20.

Twigg, C. A. (2003). Improving learning and reducing costs: New models for online learning. *Educause Review, 38*(5), 28-38.

U.S. Government Accountability Office. (2002). *Distance education: Growth in distance education programs and implications for Federal education policy*. Retrieved May 13, 2004, from http://www.gao.gov/new.items/d021125t.pdf

U.S. Government Accountability Office. (2004). *Improved data on program costs and guidelines on quality assessments needed to inform Federal*

policy. Retrieved May 13, 2004, from http://www.gao .gov/new.items/d04279t.pdf

Zirkle, C. (2002). Identification of distance education barriers for trade and industrial teacher education. *Journal of Industrial Teacher Education*, *40(1)*, 20-44.